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10/535,262	12/13/2005	Wolfgang Ehrfeld	100717-669-WCG	3593
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GERSTENZANG, WILLIAM C.				
NORRIS MCLAUGHLIN & MARCUS, PA				
875 THIRD AVE, 8TH FLOOR				
NEW YORK, NY 10022				
EXAMINER				
SOOHOO, TONY GLEN				
ART UNIT		PAPER NUMBER		
1797				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/535,262

**Applicant(s)**

EHRFELD ET AL.

**Examiner**

Tony G. Soohoo

**Art Unit**

1797

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 March 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,4,5,7-10,12-16 and 18-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,7-10,12-16 and 18-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### REMARKS

**New claim 30 presents language to to the particular relative placement of the slotted plate being “*directly above*” the 1<sup>st</sup> and 2<sup>nd</sup> feed channels**

#### **Claim interpretation**

The claims recite relative angles between the opening / slot, see claim 14, and 29, since the claim does not positively establish the axes of the opening / slot (i.e. axis along the length, width, height, or some skew angle, up or down or sideways along the opening / slot) to which one measures the angle, the claim is open to its broadest reasonable interpretation. Absent any further claim limitation, it is noted that one may construct the axis of the angles as desired anywhere along the opening or slots.

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 24 states that the feed channels have cross sections which are “constant or variable”. This appears to define every possible configuration of a cross-section, thereby appears that this does not further limit the scope of the cross-section. It is unclear what further structural distinction is made between this claim and its immediate parent claim, since it does not further limit any particular type of cross-section. The scope of claim 24 would appear to directly infringe upon the scope its

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parent claim (double patenting?). If applicant may identify what type of cross-section shape is being excluded by claim 24, the 112, 2nd paragraph will be revisited and possibly withdrawn.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

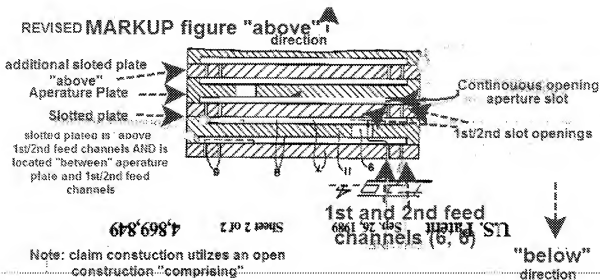
A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).



2.

3. Claims 1-2, 4-5, 7, 9-10, 12-14, 18, 20-25, 28-29 are rejected under 35

U.S.C. 102(b) as being anticipated by Hirose et al., US 4869849.

The Hirose (et al) reference discloses a plurality of stacked plates and method of operation, see figure 4, comprising the use of: (SEE THE new revised MARKUP figure with an orientation corresponding to applicant's "ABOVE" and "BELOW" direction)

- 1<sup>st</sup> and 2<sup>nd</sup> feed channel 6, 6,
- at least one slotted plate having at 1<sup>st</sup> and 2<sup>nd</sup> slot opening completely penetrating the slotted plate
- an aperture plate having at least one aperture slot arranged above the slot openings of the slotted plate, wherein the aperture slot(s) of the aperture plate forms a continuous opening between the slot openings (see also upper and lower slot openings which are offset from one another in a

top/bottom arrangement forming an overlapping, oblique, periodic pattern, and continuous opening in the markup figure)

- and wherein the slot opening of the slotted plate overlaps the first feed channel and the at least one second slot opening of the at least one slotted plate overlaps the second feed.

-and wherein the slotted plate is arranged above the 1<sup>st</sup> and 2<sup>nd</sup> feed channels and located between the aperture plate and the 1<sup>st</sup> and 2<sup>nd</sup> feed channels.

Further note there are additionally slotted plates, and aperture plates. Also note that the angle between the opening and slots can define an angle of 90 degrees

Note that the device also has a support structure housing 1, see fig 1.

Note that the stacked series of plates, one of the continuous opening above an aperture plate may be defined as a mixing chamber.

Note that the plates are thin plates, (the term micro-structured is broad and vague since the claims do not require any particular range of dimensions)

Note that the repeating configuration of the at slot openings and the aperture provides a branching of flow.

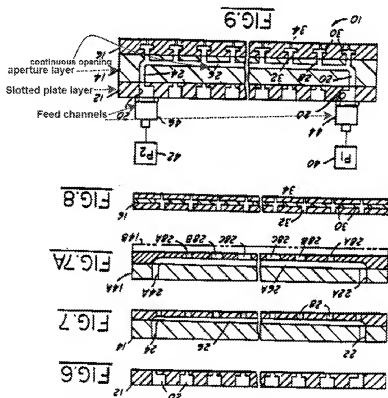
Note that the channels 6 6 are constant in cross section.

4. Claims 1-2, 4-5, 7, 9-10, 12-14, 18, 20-25, 28-29 and 30 are rejected under 35 U.S.C. 102(a), and U.S.C. 102(e) as being anticipated by Pfost et al 6,485,690.

The Pfost (et al) reference discloses a plurality of stacked plates and method of operation, comprising the use of (see fig 6-9, for example):

- 1<sup>st</sup> and 2<sup>nd</sup> feed channel from 46, 44,
  - at least one slotted plate (12) having at 1<sup>st</sup> and 2<sup>nd</sup> slot opening (left, right) completely penetrating the slotted plate
  - an aperture plate (14) having at least one aperture slot (26, see also fig 7, or 7A) arranged above the slot openings of the slotted plate, wherein the aperture slot(s) of the aperture plate forms a continuous opening (26) between the slot openings
  - and wherein the slot opening (left/right) of the slotted plate (12) overlaps the first feed channel (44/46) and the at least one second slot opening (left/right) of the at least one slotted plate (12) overlaps the second feed (44/46).
  - and wherein the slotted plate (12) is arranged **directly above** the 1<sup>st</sup> and 2<sup>nd</sup> feed channels (44/46) and located between the aperture plate (14) and the 1<sup>st</sup> and 2<sup>nd</sup> feed channels (44/46). And Further note there are additionally slotted plates, and aperture plates. Also note that the angle between the opening and slots can define an angle of 90 degrees
- Note that the device also has a support structure housing to hold the layer together (see all figures). Note that the stacked series of plates, one of the

continuous opening above an aperture plate may be defined as a mixing chamber. Note that the plates are thin plates, (the term micro-structured is broad and vague since the claims do not require any particular range of dimensions) Note that the repeating configuration of the at slot openings and the aperture provides a branching of flow. Note that the channels would be are constant in cross section or variable.



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### Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:



(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 15, 16, 19, 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose et al., US 4869849.

The Hirose (et al) reference discloses all of the recited structure and method of operation as established above.

However the Hirose reference is silent as to the having the width of the slot being 500 or 10 micrometers in (claims 15, 27); the material in which the plates are made (claim 16); and the manner in which the plates are held together (claim 19); and the manner in which the slots are formed in its construction (claim 27).

Regarding claims 15, 26, as to the size of the aperture slots, it would have been obvious to make and use the corresponding prior art device having the slot opening channel width sized in the lower range of less than 500 micrometers or 10 micrometers or less, so as be capable to utilize smaller fluid samples in the processing step thereby minimizing waste of fluid. Since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955).

Regarding claim 16, the materials of metal, glass, ceramic or plastic are known materials for the construction of mixers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to any of

such known materials for reasons of ease of construction or material cost, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim 19, the manner of holding the plates together, as recited in the claim are a known class of structure to hold structural elements together. Solder, weld, adhesive, force fit, screw, pressing or rivets are known construction elements to hold discrete structural elements together to form a single unified invention. It would have been obvious to utilize any of the known construction element to hold the Hirose's device together to provide an invention which would not fall apart into pieces.

Regarding claim 27, the manner of making the plates or making of the slots does not appear to differentiate the slotted plate element in a structural sense as long as a slot is formed and to its method of its use of the slot. Therefore, issues as to how the slot is made, i.e. by laser or LIGA techniques has been provided with little, if any, patentable weight to the structural feature of the apparatus claims, nor provides patentable weight to the manner in which the slot affects the manipulation of the fluid. In any case, such construction techniques are old and well known as a method to provide holes and slots, thus, in light of the knowledge gleaned by the common construction techniques, it would have been obvious to a person having ordinary skill in the art to make the slot by any

one of punching, embossing, milling, erosion, etching, plasma etching, laser cutting, or LIGA for use with the method of operation of the Hirose reference.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose et al., US 4869849 in view of Lowe et al 2004/0027915.

The Hirose et al., US 4869849 discloses all of the subject matter as discussed above. However the reference does not show the slots having a shape of a funnel or lobe (claim 8)

The Lowe et al reference (Lowe) discloses that a micro fluidic device may have multiple feed slots 2,2,2, 3,3,3 (figures 1b,2,3) which may be formed in the arrangement of being oblique (fig 1b), or funnel shaped or lobed shaped (figs 2,3).

In view of the showing of the configuration of the shapes of oblique, funnel or lobe shapes of channels which may enhance fluid current, in light of the knowledge gleaned by the prior art, it would have been obvious to a person having ordinary skill in the art to modify the parallel slot configuration of Hirose et al., US 4869849 with an oblique or funnel/lobe shape to the slots so as to provide an enhanced shape for urging fluid current interaction between the fluids within the chemical process.

8. Claim 1-2, 4-5, 7, 9-10, 12-16, 18-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-346352 (JP'352).

The JP '352 reference discloses **feed channel** above 11 (not shown), slot plate 10b (with slots 12), an aperture plate 10a (with apertures 11). The JP '352 does not disclose a feed channel above the aperture plate 11 and being overlapping with the slot opening 12 of 10b.

The JP '352 reference shows the stacking of slots and apertures to provide mixing. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide multiple stacks of the configuration of JP '352, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. The provision of multiple stacks would thereby provide feed channels which are overlapped with the slot opening and the structural configuration as required in the instant claim(s).

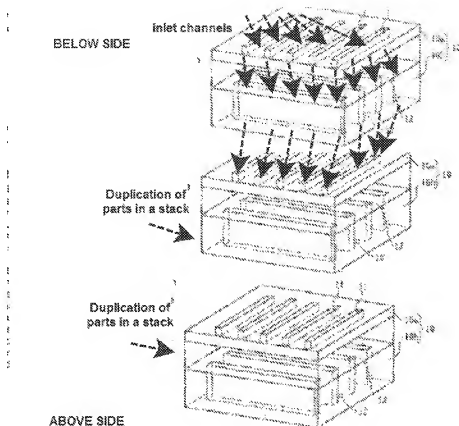
Regarding the orientation "above" or "below", the orientation does not impart any structural difference to the relative placement of the recited elements" of the JP '352 reference. One may reorient the device in a 180 degree manner to a stack of the elements, as proposed in the obviousness rejection made above. In this orientation, the relative above and below configuration would be satisfied by the multiple stacks of the elements.

Regarding claims 15, 26, as to the size of the aperture slots, it would have been obvious to make and use the corresponding prior art device having the slot opening channel width sized in the lower range of less than 500 micrometers or 10 micrometers or less, so as be capable to utilize smaller fluid samples in the processing step thereby minimizing waste of fluid. Since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In *re Rose*, 105 USPQ 237 (CCPA 1955).

Regarding claim 16, the materials of metal, glass, ceramic or plastic are known materials for the construction of mixers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to any of such known materials for reasons of ease of construction or material cost, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In *re Leshin*, 125 USPQ 416.

Regarding claim 19, the manner of holding the plates together, as recited in the claim are a known class of structure to hold structural elements together. Solder, weld, adhesive, force fit, screw, pressing or rivets are known construction elements to hold discrete structural elements together to form a single unified invention. It would have been obvious to utilize any of the known construction element to hold the JP '352 device together to provide an invention which would not fall apart into pieces.

Regarding claim 27, the manner of making the plates or making of the slots does not appear to differentiate the slotted plate element in a structural sense as long as a slot is formed and to its method of its use of the slot. Therefore, issues as to how the slot is made, i.e. by laser or LIGA techniques has been provided with little, if any, patentable weight to the structural feature of the apparatus claims, nor provides patentable weight to the manner in which the slot affects the manipulation of the fluid. In any case, such construction techniques are old and well known as a method to provide holes and slots, thus, in light of the knowledge gleaned by the common construction techniques, it would have been obvious to a person having ordinary skill in the art to make the slot by any one of punching, embossing, milling, erosion, etching, plasma etching, laser cutting, or LIGA for use with the method of operation of the JP '352 reference.



### ***Response to Arguments***

9. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection to newly introduced claim 33.

Applicant's extensive amendment has necessitated a new grounds of rejection, (or further clarification as made in the revised markups)

10. Regarding applicants mere allegation that the Hirose 1st/2nd feed channels 6, 6 are not the applicant's 1st/2nd feed channels "defined in the present claims". This is

unpersuasive since applicant has not pointed out an particular language which further distances the structure other than "1st and 2<sup>nd</sup> feed channels". A statement that applicant believes that the element 6, 6 is not the same as the element is defined in the claims does not obviate the Office's finding that the Hirose's 6, 6 meets the recited structural element.

11. Regarding applicant's remarks to the Hirose reference that it does not show the slotted plate is arranged above the 1st/2nd feed channels and located between the aperture plate and the 1st/2nd feed channels. The revised markup figure shows that it has been found that device of Hirose meets the recited arrangement.

12. Applicant's general allegation to the dependent claims that Hirose would not have lead one of ordinary skill in the art to the required features of the dependent claims is unpersuasive. The statement does not rebut the evidence of the prior art, and its rejection of the claims as made in the office action.

Regarding applicant's argument to JP 352, the mere allegation that the JP reference does not show the slotted plate above the 1<sup>st</sup>/2nd feed channels; and located between the aperture plate and the 1st/2nd feed channels is unpersuasive since the remarks does not address the obviousness modification and the relative elements of the stacks to one another being above, below and between in the manner recited in the claim. Applicant is reminded that the rejection made is not an anticipation of the claims but an obviousness type rejection.



***Conclusion***

Applicant's amendment to the inclusion of: slots *penetrating* the slotted plate, a *continuous* opening of the aperture plate, and the *overlap* of slot openings with the feed channel, necessitated the new ground(s) of rejection presented in this Office action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony G. Soohoo whose telephone number is (571) 272 1147. The examiner can normally be reached on 8AM-5PM, Tues-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/

Tony G Soohoo

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Primary Examiner, Art Unit 1797

Primary Examiner  
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